

Re: repeated eigenvalues

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In article <1107112299.285024.16660@c13g2000cwb.googlegroups.com>, <carlos@colorado.edu> wrote:

> *Jeremy Watts wrote:*

>> *is there any way of telling whether a matrix will have repeated eigenvalues?*

>> *and if so, which of the eigenvalues found are the repeated ones?*

>

> *For a general matrix there are no a priori tests I am aware of.*

In principle, if the entries of the matrix are known exactly, one need "only" compute $\gcd(\det(xI - M), (d/dx) \det(xI - M))$.

Of course while derivative and gcd computations are fast, the computation of the characteristic polynomial is slow. But that prompts the question: is there a way to compute the gcd (or otherwise find the multiple eigenvalues) efficiently using matrix techniques which are more efficient than computing the characteristic polynomial?

(Assume rational or symbolic entries to eliminate concerns with round-off of floating-point calculations.)

dave